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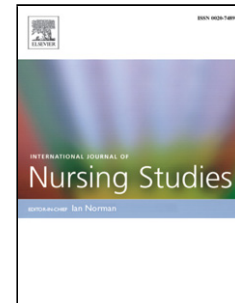
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Title

Online learning versus blended learning of clinical supervisee skills with pre-registration nursing students: A randomised controlled trial

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Background

The World Health Organisation amongst others recognises the need for the introduction of clinical supervision education in health professional education as a central strategy for improving patient safety and patient care. Online and blended learning methods are growing exponentially in use in higher education and the systematic evaluation of these methods will aid understanding of how best to teach clinical supervision.

Objective

The purpose of this study was to test whether undergraduate nursing students who received clinical supervisee skills training via a blended learning approach would score higher in terms of motivation and attitudes towards clinical supervision,

knowledge of clinical supervision and satisfaction of learning method, when compared to those students who received an online only teaching approach.

Design

A post-test-only randomised controlled trial.

Methods

Participants were a total of 122 pre-registration nurses enrolled at one United Kingdom university, randomly assigned to the online learning control group (n = 60) or the blended learning intervention group (n = 62). The blended learning intervention group participated in a face-to-face tutorial and the online clinical supervisee skills training app. The online learning control group participated in an online discussion forum and the same online clinical supervisee skills training app. The outcome measures were motivation and attitudes using the modified Manchester Clinical Supervision Scale, knowledge using a 10 point Multiple Choice Questionnaire and satisfaction using a university training evaluation tool. Statistical analysis was performed using independent t-tests to compare the differences between the means of the control group and the intervention group. Thematic analysis was used to analyse responses to open-ended questions.

Results

All three of our study hypotheses were confirmed. Participants who received clinical supervisee skills training via a blended learning approach scored higher in terms of motivation and attitudes - mean (m)=85.5, standard deviation (sd)=9.78, number of participants (n)=62 - compared to the online group (m=79.5, sd=9.69, n=60) (p=.001). The blended learning group also scored higher in terms of knowledge (m=4.2, s d=1.43, n=56) compared to the online group (m=3.51, sd=1.51, n=57)

($p=.015$); and in terms of satisfaction ($m=30.89$, $sd=6.54$, $n=57$) compared to the online group ($m=26.49$, $sd=6.93$, $n=55$) ($p=.001$). Qualitative data supported results.

Conclusion

Blended learning provides added pedagogical value when compared to online learning in terms of teaching undergraduate nurses clinical supervision skills. The evidence is timely given worldwide calls for expanding clinical skills supervision in undergraduate health professional education to improve quality of care and patient safety.

What is already known about the topic?

- Clinical supervision has internationally recognised potential to improve patient care and patient safety by promoting ongoing systematic reflection-on-action by the health professional with a supervisor in clinical practice.
- Blended learning is being pursued in higher education as a means to support students but there is a lack of evidence to support its implementation.

What this paper adds?

- Blended learning does have added value when compared to full online learning in terms of motivation and attitudes to clinical supervision, student satisfaction and knowledge.

- This results of this study provides educators with valuable information to aid in the selection of the most appropriate method for teaching pre-registration nurses.

Keywords: App technology

Blended learning

Nurse education

Online learning

Student satisfaction

clinical skills

1. Introduction

Internationally the establishment by the World Health Organisation of the *World Alliance for Patient Safety* 2002 (WHO, 2002) and the continuous development of global patient safety protocols (WHO, 2017), along with high profile national government inquiries into failures in healthcare (for example the Francis Report (2013) in the United Kingdom), has led to an increased spotlight on nurse education and especially the teaching methods employed to support safe and competent practice development. One of the methods recognised as being significant in the development of knowledge and competence in clinical practice is clinical supervision (Franklin, 2013; White and Winstanley, 2010). This paper reports on a randomised controlled trial, conducted to compare online-only versus blended learning of clinical

supervisee skills in undergraduate nurse education in a United Kingdom higher education institution nursing curriculum.

Clinical supervision is a formal process of reflection and review that typically occurs between a more experienced and a less experienced nurse (McCutcheon, 2013). Kaufman et al. (2014), in a study which involved nursing students, suggested that clinical supervision could be used as a means to improve compassionate patient care. However, clinical supervision is more widely recognised as important in post registration nursing practice (Lintern, 2013; White and Winstanley, 2010) and is less acknowledged in undergraduate nurse education, where its implementation continues to be haphazard (Franklin, 2013).

Clinical supervision is also commonly misinterpreted in undergraduate nurse education as being similar to mentorship. However, although clinical supervision has similarities to the role of mentorship, there are distinct differences. Mentorship in undergraduate nursing tends to be more assessment focused where a mentor observes the student, provides feedback on performance and completes high risk summative assessments (McCutcheon, 2013). Clinical supervision, by contrast, involves a supervisor who may not have worked with the student and instead explores learning through the use of reflection-on-action. Studies have suggested that the introduction of clinical supervisee skills, which includes the ability to critically reflect, participate and communicate effectively in a supervisory relationship, may better prepare students for professional practice (McColgan and Rice, 2012; Staun et al., 2010). The development of these skills can also facilitate their participation and acceptance of clinical supervision throughout their careers (Rigby et al., 2012; Staun et al., 2010; Carver et al., 2007).

While the rationale for clinical supervisee skills to be included within undergraduate nurse education may have become apparent among the international policy community, the optimal method of teaching clinical supervisee skills within large undergraduate cohorts and within higher education institutions has not (McCutcheon et al., 2016). In today's higher education institutions, it is impossible to study optimal teaching strategies without due consideration to online teaching strategies either on their own or as complimentary to other methods of teaching (Dearnley et al., 2013; Behnke, 2011). Online learning has progressed from the early forms of distance education that were based on correspondence type courses, video conferencing and educational television programmes (Zhao et al. 2006). Today, it consists of Massive Online Open Courses that provide large scale global access to higher education courses, 3D virtual learning spaces, software applications (apps), webinars and the more established web-based platforms. Online learning is also recognised now by most higher education institutions as one method to deliver a less resource intensive teaching product (McCutcheon et al., 2015; Means et al., 2010). However, the application of educational content on online and mobile platforms, such as app technology, raises a number of issues such as user engagement, the integration of user experience across all multi-media, the need for cross platform support and the ease of accessibility of the app (Johnson et al., 2013; McCutcheon, 2013). It could be assumed that these technical, social and organisational factors have challenged the implementation of an online-only learning pedagogy.

A desire to retain the advantages of face-to-face learning while also introducing the advantages of online learning, has led to the emergence of other hybrid or blended teaching strategies. Blended learning is difficult to define with a wide variety of blended learning designs available. Driscoll and Carliner (2005, p.89) stated that

there are four main interpretations associated with blended learning: “(1) a mix of Web-based technologies; (2) a mix of various pedagogical approaches; (3) a combination of any form of instructional technology with face-to-face instructor led instructions; (4) a combination of instructional technology with job tasks to form an effective mix of learning and working”. The definition used as a basis for this study is closely linked to Driscoll and Carliner’s (2005) point three listed above and is consistent with Horn and Staker (2011, p.3) who defined blended learning as “any time a student learns at least part at a supervised brick-and-mortar location away from home and at least part through online delivery with some element of student control over time, pace, path, and/or pace”. Blended learning has received support from many academics and higher education institutions (Cho and Shin, 2014; Waha and Davis, 2014; ILot et al., 2013). However, systematic reviews have indicated a lack of available evidence to support the blended learning approach to teaching clinical skills in healthcare education. (McCutcheon et al., 2015; Dearnley et al., 2013; Rowe et al., 2012).

Aim of this Study

The aim of this study was to compare online-only learning with blended learning in terms of the educational impact on the knowledge, motivation and attitudes of undergraduate students in relation to clinical supervision; and their satisfaction with the learning modalities. The three hypotheses of the study were that participants who received clinical supervision skills training via a blended learning approach will score higher in terms of:

1. Motivation and attitudes, as measured by a modified Manchester Clinical Supervision Scale when compared to an online-only teaching approach.

2. Knowledge, as measured by a multiple choice question assessment when compared to an online-only teaching approach.
3. Learner satisfaction, as measured by a training evaluation, when compared to an online-only teaching approach.

2. METHODS

The CONSORT guidelines for reporting randomised controlled trials (RCTs) has been used to describe the methods (Moher et al., 2009). Although there are no specific guidelines designed for the reporting of an online or blended learning teaching strategy, the GREET statement (Phillips et al., 2016) for reporting evidence based practice educational interventions alongside the TIDieR checklist and guide (Hoffman et al., 2014) have been adhered to in describing the teaching interventions and processes involved.

Trial Design

This paper reports on a post-test only randomised controlled trial, conducted to compare online-only versus blended learning of clinical supervisee skills in undergraduate (pre-registration) nurse education.

2.1 Participants and sample size

This study population was an entire cohort of 125 undergraduate final year adult nursing students enrolled at a higher education institute in Northern Ireland, United Kingdom, in 2013. Recruitment to the study took place prior to the introduction of the clinical supervision training. Students were informed about the study processes and that their participation in the study was voluntary and that they were free to withdraw

at any stage in the process without any consequence. A total of 122 students consented and were included in the outcome analysis (62 in the intervention group and 60 in the control group). Ethical approval was obtained from the university ethics committee prior to the commencement of the study.

2.2 Teaching Interventions in Intervention and Control Groups

First, we describe the teaching interventions that all students received, namely an online clinical supervision training app. Then, we describe the two interventions that distinguished the control (online discussion forum) and intervention (face-to-face tutorial) groups (Figure 1).

2.2.1 Online App

All students in the study undertook the online clinical supervision training app entitled 'Clinical Supervisee Training' developed by the researcher (a University senior lecturer) designed for inclusion in the final year BSc Nursing degree module on 'Leadership and Management'. This is a theoretical module which prepares the student to develop knowledge, critically analyse and apply management and leadership theory to a range of enquiry based learning scenarios in preparation for clinical practice and the United Kingdom Nursing and Midwifery Council (NMC) registration. The students were not offered any incentive to complete the clinical supervision training as it was a requirement of the module and included in the end of module exam.

Rationale of essential elements

As clinical supervision has at its focus reflective practice principles, it was important that the online teaching tool was designed to encourage the students to search out

and create their own knowledge bases, consistent with a constructivist approach. The key learning objectives associated with the development of this teaching intervention were that:

1. the student would be motivated to identify explicit examples from their clinical experience that would encourage reflection and promote personal professional development.
2. the student would understand the principles and concepts of clinical supervision.

Description of the materials

The app consisted of a two hour long interactive multi-media presentation on the theoretical and practical aspects of clinical supervision. It contained hyperlinks to United Kingdom Department of Health patient care inquiry documents and hyperlinks to patient safety videos created by the World Health Organisation. Reflective thinking points were also used to encourage the student to build their own knowledge. The exploration of these inquiries and safety videos enabled the student to build knowledge on the conceptual principles of clinical supervision. In order to encourage the student to develop and create the rules that govern supervision, a number of interactive tests and also two short video clips, one of which was an animated supervision session was included. At the end of the training app the students were given a set of reflective questions which were designed to encourage the student to apply their learning to a variety of different clinical situations. Further information on the content of the app is available at the following website: <https://www.qub.ac.uk/schools/SchoolofNursingandMidwifery/ClinicalEducationCentre/>. The design and logic model related to the app is also available (McCutcheon and Lohan, 2017).

Modes of delivery

The app was made available first to all students to access via their android off campus for a four week period commencing on week two of a six week leadership and management module (Supplementary appendix 1). A student tracking device was available to view how many times each student had accessed the app.

2.2.2 Scenarios and online discussion forum

Rationale of essential elements

A discussion forum using two clinical practice scenarios was created to explore the practical techniques of clinical supervision and to provide online peer and lecturer student discussion of these issues. The discussion forums were asynchronous which provided the student with increased flexibility as to when they could engage in learning. Asynchronous learning is recognised as one of the primary benefits of online learning (Andressen, 2009). The student has an opportunity to think through their idea before sharing this online which can lead to in-depth learning and reflection. The main learning objective associated with this teaching intervention was that the student would develop and practice the necessary supervisee communication skills required to engage in effective clinical supervision.

Description of the materials

Two scenarios were developed by the researcher to aid students' thinking on how clinical supervision could apply to them in the workplace. (Supplementary Box 1). It was important that the students had gained the knowledge presented in the clinical supervisee training app before engaging in the discussion forum, so that they could respond appropriately with the scenarios and questions posed in the forum.

Who delivers the intervention?

The researcher was the tutor responsible for the management of this discussion forum and facilitated the discussion on a daily basis.

Modes of delivery

Two weeks after access had been given to the app, control group students were given access to the online discussion forum for a further two weeks (Figure 1). It was anticipated that the students would spend up to one hour engaged in the online discussion forum. The control group students received a formal email with a request that they engaged and provided a response in the online discussion forum on at least one occasion for each scenario before the start of week five of their module. Students were encouraged to respond to each other's comments and were sent a reminder email to encourage them to engage with the discussion forum. However, the online discussion forum was not a prerequisite to successive completion of the module.

2.2.2 Face-to-face tutorial

Rationale of essential elements

Similar to the main learning objective for the online discussion forum, the face-to-face tutorial was created to explore the practical techniques of clinical supervision and to develop the necessary supervisee communication skills required to engage in effective clinical supervision.

Description of the materials

The face-to-face tutorial lasted for one hour and each tutorial group consisted of 21 students and one instructor. Each session used the same two clinical practice scenarios as in the online discussion forum reported above (Box 1).

Who delivers the intervention?

The researcher was the tutor responsible for the delivery of each of the face-to-face tutorials.

Modes of delivery

Similar to the control group students' access to the app was given two weeks prior to the face-to-face tutorial (Supplementary appendix 1). The session began with a brief introduction as to the nature of the tutorial. The class was then divided into four groups of four and one group of five. Three of the groups were given scenario one and two of the groups were given scenario two to discuss. Students were given marker pens and flipchart paper to write their responses to the scenario questions and were advised to nominate one member of the group to provide the feedback of their responses to the entire tutorial class. Students were given a period of 30 minutes to complete this task. During this group work, the tutor observed the groups and assisted with any questions the students had with regards to the group work. After the 30 minute time slot, each group reported their responses on the scenario questions to the rest of the tutorial class. Any questions raised by the students were answered by the tutor.

2.3 Randomisation process

Participants were randomly assigned by a university employed administrator, who had no knowledge of the recruitment or data collection for this study, following simple randomisation procedures (computerized random numbers) to the intervention or the control group (Supplementary appendix 1). The intervention group was offered blended learning (online app plus face-to-face tutorial), consistent with a blended learning approach as defined by Horn and Staker (2011). The control group was

offered online-only (online app plus online discussion forum). All students (intervention and control groups) first completed the online app. The administrator then contacted the module coordinator (not a part of the research team), who acted as gatekeeper for the study, so that the face-to-face tutorial groups for the intervention group could be organised and access to the discussion forum could be given to the control group. The module coordinator then divided the intervention group into three face-to-face tutorial groups, each with 21 students. Blinding of students as to which arm of the study they had entered was not possible due to the pragmatic nature of the educational intervention. A comparison between control and intervention group characteristics was undertaken to determine the success of the randomisation process in terms of obviating bias with regards academic achievement. Data, which included socio-demographic characteristics, were collected at one time point only, post the teaching intervention.

2.4 Outcome measurements

Three data collection tools were used in this study and were collectively administered as a combined data collection tool. Instrument one and instrument three used a Likert rating scale which asked the respondent to signify the strength of their support or disagreement with a specified series of statements using a five point range. The data collection tools had never been used with nursing students a small pilot study was undertaken with 15 undergraduate nursing students, not involved in the main study, to determine content-related validity prior to the commencement of the main study. This pilot study preceded the main observation and enabled adaptation of the tools in relation to the instructions to students, the structure and presentation of three research instruments and to the adaptation of the main intervention itself, thereby improving the overall quality of the research study. This

pilot study at 'face-value' determined that the language used was written in understandable lay terms.

2.4.1 Motivation and attitudes

The main changes made to the tools as a result of the pilot study were applicable to instrument one the Manchester Clinical Supervision Scale, a 36 item questionnaire. The Manchester Clinical Supervision Scale is reported to be the only internationally validated instrument with established psychometric properties that evaluates clinical supervision (Winstanley and White, 2003). Statements that received a consistent 'no opinion' response from all 15 students involved in the pilot study were removed from the Manchester Clinical Supervision Scale questionnaire. A total of 12 redundant statements were removed (Supplementary appendix 2). Each of these statements were irrelevant to the students because of their lack of experience of clinical supervision in clinical practice. Changes were also made to the wording of some statements namely the conversion of present tense sentences to future tense sentences. The pilot study resulted in a modified 24 statement Manchester Clinical Supervision Scale (Table 2). Following these changes a further face validity exercise was undertaken with two nurse lecturers to determine the suitability of these modifications.

This modified Manchester Clinical Supervision Scale was chosen as a method to explore the students' motivation and attitudes towards clinical supervision and to test the following hypothesis:

- Undergraduate nursing students who received clinical supervision skills training via a blended learning approach will score higher in terms of motivation and attitudes, as measured by a modified Manchester Clinical

Supervision Scale, when compared to those who received an online-only teaching approach.

The student was asked to choose the response best reflective of their feelings regarding clinical supervision following the training they had received. There are seven subsections within the original tool. The section that included supervisor support was removed as it was determined that these questions would be irrelevant for the students to answer without actual experience. This modified tool has a total of six subsections (Supplementary appendix 3). Higher factorial scores would imply an increased positive effectiveness of that particular factor. The overall score of the questionnaire has a range from 24-120, with lower scores indicating a low level of perceived effect in positive motivation and attitudes towards clinical supervision. The Cronbach's Alpha co-efficient for this scale is .88 in our trial data reported here indicating that this scale is internally consistent and reliable (Kline, 2000).

2.4.2 Knowledge

Instrument two is a set of 10 multiple choice questions which were chosen as a method to explore the students' knowledge of clinical supervision post-completion of training to test the following hypothesis:

- Undergraduate nursing students who received clinical supervision skills training via a blended learning approach will score higher in terms of knowledge, as measured by a multiple choice question assessment when compared to those who received an online-only teaching approach.

The multiple choice questions used were taken from the current local clinical supervision training assessment that exists within a Health and Social Care Trust in

Northern Ireland (Table 3). These multiple choice questions had not been used in any previous studies and had not previously been tested for any construct validity or reliability other than the pilot study detailed in 2.4. The multiple choice questions were deemed to be applicable, as the clinical supervision training in this study is comparable to that delivered by the Trust. Each of the 10 questions had a choice of four possible answers listed as a, b, c, d and students were asked to circle the answer they thought was most appropriate. Each correct answer was awarded one point with an incorrect answer awarded zero. In order to assess the reliability of the Knowledge Scale we examined the extent to which each of the 10 items in the scale contributes the scale's overall discriminatory quality within this study. Following, for example, Carpenter et al. (2009) we identify 'high scorers' on the scale, who correctly answered either 6, 7 or 8 questions (8 was the maximum correctly answered) and 'low scorers' on the scale who correctly answered either 0, 1 or 2 questions (0 was the minimum correctly answered). For each item on the scale we then identified the percentage of 'high scorers' who answered that item correctly and the percentage of 'low scorers' who answered that item correctly. We subtracted the latter from the former to arrive at each item's discrimination index, as reported in the final column of Table 3.

2.4.3 Satisfaction

Instrument three is a student training evaluation form and was chosen as a method to explore the students' satisfaction with their learning experience and to test the following hypothesis:

- Undergraduate nursing students who received clinical supervision skills training via a blended learning approach will score higher in terms of learner

satisfaction, as measured by a training evaluation, when compared to those who received an online-only teaching approach.

The training evaluation form was adapted from the higher education institutions established module evaluation form, which had been extensively used by undergraduate nursing students as a means to review modules (Table 4). This training evaluation has three sections. Section one uses a five point Likert scale where 1= strongly disagree, 2= disagree, 3= No opinion, 4=Agree and 5= strongly agree. There are five questions that the participants are asked to score in this section. The respondent was asked to choose the response best reflective of their feelings regarding the clinical supervision learning experience. Only the responses from the five questions can be summed as they use the same Likert scoring system. The total score from these five questions provides a range from 5-25, with lower scores indicating lower levels of satisfaction and higher scores indicating higher levels of satisfaction. Section two uses a three item scale which is categorically measured (work level is either good ('about right') or bad ('excessive' or 'too little')). In addition to the regular evaluation questions students were also asked to indicate the length of time spent engaged in the online training. The Cronbach's Alpha coefficient for this scale reported in this study is .87, indicating that this scale is internally consistent and reliable (Kline, 2000).

Finally, the evaluation concluded with three open ended questions that encouraged the student to respond in their own words with their personal opinion on the clinical supervision training.

1. What did you find most satisfactory about the training?
2. What did you find least satisfactory about the training?

3. What could be done differently?

2.4.4 Student access to resources

In terms of measuring the students' access and exposure to online resources and the discussion forum the module co-ordinator, responsible for managing the input and posting of module resources, was contacted and asked to provide detail on the students' electronic access of the clinical supervision training. Tutorial student registers were also made available to confirm attendance at face-to-face sessions.

2.5 Data Collection

Data collection occurred the week after completion of clinical supervision training and was conducted at the beginning of a lecture at which all students in the sample population were required to attend. The three data collection tools used in this study were collectively administered as one combined data collection tool. The front page of the combined data collection tool gathered some baseline characteristics of each student, namely sex and age. The data collection tools were administered to all students under supervision by teaching staff that were blinded to the study and group allocation.

A power calculation was undertaken based on Epi Info version 3.5.1 (Epi Info version 3.5.1., 2008). This power calculation used a standard deviation of 18 for use in a two sided independent t-test. This determined that 63 participants in each group would give 80% power at the .05 level of significance to detect a difference between groups in terms of motivation and attitudes (as measured by a modified Manchester Clinical Supervision Scale) corresponding to a medium effect size (Cohen's $d = .5$).

2.6. Analysis

Statistical analysis was performed using IBM Statistical Package for the Social Sciences SPSS, version 19 (Pallant, 2013). Responses to all questions were coded and entered into SPSS. Our primary statistical analysis involved comparison of the mean values of our two experimental groups on each one of our three outcome variables. We used the conventional .05 statistical significance threshold (two-tailed) and conducted independent samples t-test. In further analyses to assess the robustness of our findings, we conducted multiple linear regression analyses in which age, training time and education modality (online-only versus blended learning) were simultaneously entered into the regression model. Missing data is also reported for each of the outcome variables. Data obtained from the open-ended questions were analysed using a six stage qualitative thematic analysis (Braun and Clarke, 2006).

3. Results

3.1 Description of participants

One hundred and twenty two final year undergraduate nursing students volunteered to take part in the study from a total population of 125, which equated to a 97.6% response rate (Table 1). Participants were mainly female with 95% in the control group and 93.5% in the intervention group. The majority of respondents was aged between 18-25 years with 56.7% in the control group and 66.1% in the intervention group, with the remainder being over 25 years. This demographic result is comparable to other university nursing programmes in the United Kingdom. Although all 122 participants completed the motivation and attitudes scale, 10 students failed to complete the satisfaction questionnaire and nine students failed to participate in

the knowledge test. There were no reasons noted for this lack of completion (Supplementary appendix 4)

3.2 Outcome measure results

3.2.1 Motivation and attitudes

An independent samples t-test was conducted to compare mean scores of the online group and the blended learning group on the modified Manchester Clinical Supervision Scale. The blended group had a more positive position on the scale – mean (m)=85.5, standard deviation (sd)=9.78, number of participants (n)=62 – than the online group (m =79.5, sd =9.69, n =60) and this difference is statistically significant (p =.001). This effect is reasonably strong, with an eta-squared value of .09 suggesting that approximately 9% of the variation in motivation and attitudes may be explained by the type of educational experience (online versus blended).

Table 2 provides the full list of items for the modified Manchester Clinical Supervision Scale, and reports the mean position of the participants in the blended and online groups on each of the items. The items are ranked by the size of the mean difference in order to illustrate the particular items in the scale that are most effected by the experimental design. Specifically, being in the blended rather than the online group had a particularly big effect (approximately half a point or more on the five point scale) on driving participants to disagree that clinical supervision is ‘not necessary’ or ‘takes nurses away from real work.’ Similarly, participants in the blended group were more likely to agree that ‘supervision sessions could widen my clinical knowledge base’ and ‘could make me a better practitioner’.

3.2.2 Knowledge

Participants in the blended group had a higher success rate in the knowledge test ($m=4.2$, $sd=1.43$, $n=56$) than participants in the online group ($m=3.51$, $sd=1.51$, $n=57$) and this difference is statistically significant ($p=.015$). However, the strength of the relationship is lower than the case for motivation and attitudes, with an eta-squared value of .05, suggesting that 5% of the variation in knowledge score was driven by type of learning. Table 3 lists the full set of 10 knowledge questions that the participants were asked. The responses to each question (correct answer versus incorrect answer) were cross tabulated against the type of learning in order to identify whether being in the blended rather than online group was associated with correctly answering particular questions. The Pearson Chi-Square value was statistically significant for 'blended' participants knowing how often supervision should be undertaken (twice a year), the aim of supervision (to encourage), when ground rules should be established (at the start of each session) and what supervision is for (to improve patients' safety).

3.2.3 Satisfaction

Participants in the blended group ($m=30.89$, $sd=6.54$, $n=57$) indicated a higher level of satisfaction than participants in the online group ($m=26.49$, $sd=6.93$, $n=55$) and this difference is statistically significant ($p=.001$). The relationship is slightly stronger than that for motivation and attitudes, with an eta-squared value of .10 suggesting that 10% of the variation in satisfaction levels of participants is due to whether they engaged in online or blended learning. Table 4 reports each of the eight items that make up the satisfaction scale. First, the five items that are measured on a five point scale (1=poor, 5=excellent) are all statistically significant at .01 or better and have similar effect sizes (approximately half a point differences on the five point scale). In terms of the three items that are categorically measured (work level is either good

(‘about right’) or bad (‘excessive’ or ‘too little’)), all three produce Pearson Chi-Square values that are statistically significant.

3.2.4 Study Rigour

We also conducted multiple regression analyses to test the robustness of our finding that blended learning leads to a higher level of motivation and attitudes, knowledge and satisfaction than online learning. Given the continuous nature of our three outcomes measures we run OLS regression. In addition to the experimental education type variable (blended versus online) we also included the length of time participants took to do the training in case time length varied across experimental group and affected our substantive findings. Age was also included as a further control. The co-efficients of blended versus online learning in these regressions can be interpreted as ‘adjusted means’, essentially the same as mean difference at bivariate level but taking account of co-relationships with the other predictors entered in the multiple regression. This exercise in multiple regression has no effect on our substantive findings, with adjusted means highly similar to the means reported above. (See Tables 5 and 6 for full regression results for each outcome variable).

There are no missing data cases for the motivation and attitude scale, 10 for the knowledge scale and nine for the satisfaction scale. The principles of intention-to-treat emphasise the importance of analysing all participants to alleviate any danger that substantive findings are affected by the non-inclusion of participants who only partially complete. Hence, we conduct investigations to assess whether these missing cases are substantively different from the non-missing cases. When we compared the mean motivation and attitude position of the missing cases to the non-missing cases (on both satisfaction and knowledge) we found no statistically

significant differences at the .05 level, suggesting no significant attitudinal divergence between the missing and non-missing cases. Furthermore, investigation of the occurrence of missing cases in our satisfaction scale revealed that six of the nine cases related to the three categorical measured variables capturing satisfaction levels to work and teaching intensity. Hence, we regenerated a satisfaction scale using just the five interval level measures, reducing the number of missing cases to three. Re-running the analysis revealed no substantive differences in the findings.

3.2.5 Qualitative Data

The qualitative information gathered from three open ended questions found in the final section of the training evaluation further elaborates some of the students' preferences on the clinical supervisee training. There was a 40.3% (n=25) response rate from the blended intervention group compared to 21.6% (n=13) response rate from the online control group. Following coding of the students' comments, five overarching themes emerged which were related to the students' overall satisfaction with the clinical supervision training. The following themes are in the order of the level of responses received, starting with the most received comments to the least received comments.

- 1) *Learning preferences* in terms of the amount of face-to-face teaching: 20 participants commented on this (n=12) from the blended intervention group as most satisfactory compared to (n=8) from the online control group as least satisfactory.
- 2) *Time* required to undertake the training: 16 participants commented on this as least satisfactory (n=10) from the blended intervention group in terms of 'too little time' compared to (n=6) from the online control group who reported the training as involving 'too much time'.

3) *Explanations and instructions* on how to use the app and the discussion forum: 10 participants commented on this (n=4) from the blended intervention group as least satisfactory compared to (n=4) least satisfactory and (n=2) most satisfactory from the online control group.

4) *Online interactive activity* in terms of the quantity and the quality of the activities used in the app: 10 participants commented on this all from the online control group either as most satisfactory or how to improve the app design.

5) *Knowledge and professional development* in terms of how clinical supervision could benefit their practice: seven participants commented on this all from the blended intervention group as most satisfactory.

Overall, the data supports students' preferences for a blended learning approach to clinical supervision skills, but with indications of how increased training time for those new to online learning could improve satisfaction for the online only option, as well as practical feedback on how to improve the content of online only teaching of clinical supervision skills.

3.3 Student access to resources

A number of unanticipated outcomes linked to user satisfaction arose which centred on the students' access of the clinical supervision training app. At the initial introduction of the clinical supervision training app, a number of emails were received by the module coordinator from students. These were primarily concerned with access to the online resource and a request for more instructions on how to open the app. One student reported that they had limited internet access at home.

The module coordinator reported via email correspondence that 119 participants out of the total population of 125 participants had clicked on the clinical supervisee training app resource at least once during the study period. A reported six participants had not clicked on the resource during the specified time period of the study.

The module coordinator also reported that a total of 13 participants out of the total population 62 participants from the control arm, had engaged in the online discussion forum. In summary, 49 participants failed to engage in the online discussion forum and in terms of the face-to-face tutorials full attendance of students was noted on class registers.

4. Discussion

We have empirically confirmed all three of our hypotheses in that participants who received clinical supervision skills training via a blended learning approach will score higher in terms of:

1. Motivation and attitudes, as measured by a modified Manchester Clinical Supervision Scale when compared to those who received an online-only teaching approach.
2. Knowledge, as measured by a multiple choice question assessment when compared to those who received an online-only teaching approach.
3. Learner satisfaction, as measured by a training evaluation, when compared to those who received an online-only teaching approach.

Our study suggests that blended learning offers pedagogical benefits in terms of improving students' motivation and attitudes, student satisfaction and students' subject specific knowledge in relation to clinical supervision, when compared to online-only learning. Moreover, there appears to be a strong effect size in relation to the students' motivation and attitudes to clinical supervision and satisfaction respective of the teaching method used. Turning specifically to hypothesis two, however, we note that although a higher level of knowledge was detected for the blended learning group, overall the students' scores were relatively poor across both groups. Since neither group achieved a score above 5 (out of a possible 10), neither group attained a successful outcome of achievement in the multiple choice questions. Therefore, the results reported here, although statistically in support of this study's second hypothesis, should be applied with some caution.

The results of this study are consistent with previous studies that report lower levels of student satisfaction in relation to online-only learning which has been related to a lack of social presence, instructor feedback and a failure to consider the students' learning preferences (Seiver and Troja, 2014; Chen and Wang, 2009). However, as educational software continues to develop and improve in areas such as gaming, augmented reality and virtual reality, the potential exists to remove these barriers to student learning. Further research in this area will be essential to increase the evidence base on this important topic.

The importance of clinical supervision within clinical practice is universally recognised as a fundamental building block for generating systematic mentoring of good practice to improve patient safety and high quality patient care (WHO, 2017; WHO, 2002). The learning of clinical supervisee skills is the first and most important step in enabling clinical supervision to occur in clinical practice (McColgan and Rice,

2012; Staun et al., 2010) and is also recognised as important in terms of the development of knowledge and competence in clinical practice (Franklin, 2013; White and Winstanley, 2010). In this paper we have argued along with others for the groundwork of learning clinical supervisee skills to be laid down in the undergraduate programme (Staun et al., 2010; Carver et al., 2007). We have generated robust evidence to support pedagogical decision-making on how to effectively teach clinical supervisee skills in undergraduate nurse education in order to achieve the best results in motivation and attitudes, knowledge acquisition and student satisfaction in learning.

5. Limitations and Recommendations

There are a number of limitations we wish to highlight that could inform future research. The study population was restricted to one undergraduate nursing cohort enrolled in a single higher education institution in the United Kingdom, thereby limiting overall generalisability of the study findings. In addition, we acknowledge that the sample size was marginally under that suggested by the power calculation. After completion of our pilot study prior to the main study, modification of the Manchester Clinical Supervision Scale was deemed necessary. This was because this research instrument was designed for post registrant nurses already engaged in clinical supervision in practice. The modification of any research instrument has the potential to affect its reliability and validity and the need for psychometric testing of properties in the form of a factor analysis is recognised as the most effective method to use to assure a tool's internal validity. However, due to a number of impeding factors, the opportunity to undertake a factor analysis in this study was unavailable and a pilot study testing face validity prior to the main study was identified as an alternative means to determine content-related validity. In addition, the Cronbach's Alpha for the

tool obtained in the trial data was .88 and suggests the tool as used was reliable and this revised version may be of use in further studies. We acknowledge also that the multiple choice knowledge questions used in the study had not previously been applied to undergraduate nurses and, despite the small pilot study undertaken, this tool may have proved to be inappropriate for this target population. Ideally, one might use a knowledge scale that has been used in many previous studies. Although our knowledge scale may be limited in the sense that it lacks validation from a series of prior studies, the questions were of an appropriate level of difficulty given that they achieved the aim of generating variation among participants in our knowledge outcome variable. Also, we suggest that our questions are appropriate because they were derived from the substantive material with which students are expected to engage, so again, this may be a useful measurement tool for others to build upon.

Further limitations may have arisen due to the quality of the interventions themselves. The asynchronous nature of the online discussion forum may have had a bearing on the poor level of student uptake, satisfaction and learning experience with the online modality. On reflection, a more consistent lecturer presence in the discussion forum aspect of this study may have benefitted the social interaction amongst the students. Future studies that explore the student's satisfaction with online learning should consider the examination of synchronous discussion forum versus an asynchronous discussion forum to investigate this phenomenon further.

A potential for bias also exists. It was not possible to blind participants to participation. The researcher acted as the tutor for the face-to-face tutorial and may have inadvertently affected the quality of the intervention delivery. To protect against this risk, a number of strategies were applied which included, the strength of the research design and the involvement of an independent person who was blinded to

the study in providing all information to the students on all aspects of the study and for the collection of outcome data. Finally, this study addresses motivation and attitudes, knowledge and satisfaction with clinical supervisee training, rather than the measurement of students' performance in healthcare practice. Thus, the impact of this component on future nurses' professional behaviour in practice remains unknown, future studies should consider exploring this important aspect.

6. Conclusion

The overall conclusion reached by this study was that blended learning does have added value when compared to online learning only in terms of teaching undergraduate nursing students clinical supervision as measured in terms of their motivation and attitudes towards learning clinical supervision, student satisfaction with the learning modality and their knowledge of clinical supervisee skills. We have entered a note of caution in relation to the latter finding, however, as improved knowledge appeared low in both online-only and the blended learning group in this study.

The results obtained from this study add much needed new evidence in relation to the optional teaching modality of clinical supervision educational programmes in undergraduate nurse education (Rigby et al., 2012; Staun et al., 2010; Carver et al., 2007). The results also add to the existing evidence base for blended learning in higher education more generally (Rowe et al., 2012, Behnke, 2011). Moreover, the study demonstrates the feasibility of conducting robust pragmatic randomised controlled trials alongside qualitative research within undergraduate nursing education (McCutcheon et al., 2015; Dearnley et al., 2013), which will produce the best student led evidence on the effectiveness of teaching innovations in the curricula. Future studies will have new opportunities to study the latest technological innovations in online learning such as virtual reality. In addition, future studies should measure the longer term effects in nursing practice of offering undergraduate nursing students clinical supervision skills in the undergraduate programme.

Conflict of interest

No conflict of interest declared by the authors.

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Figure 1. Illustration of interventions applied to each group

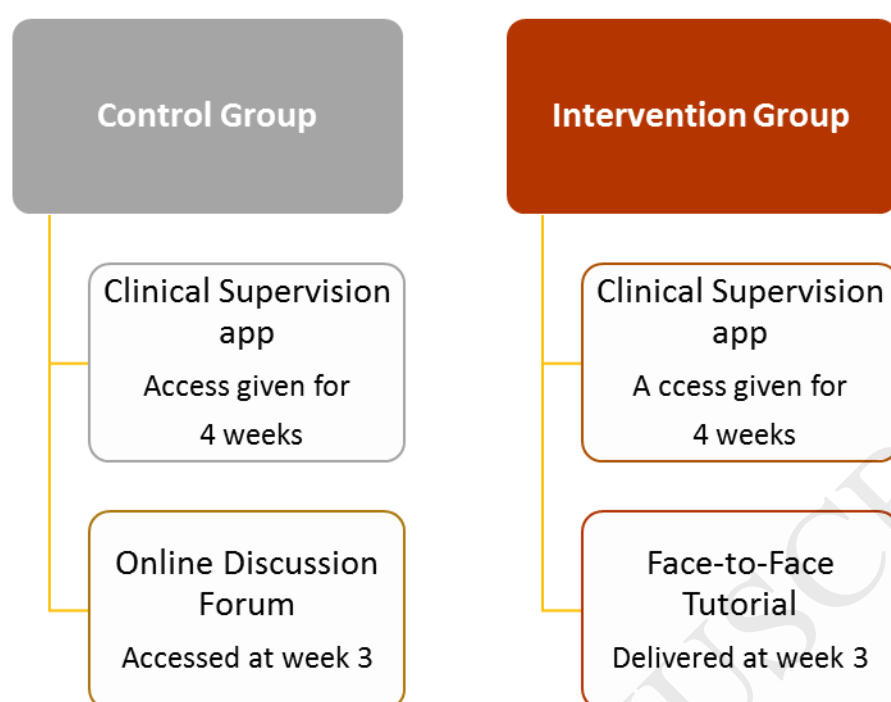


Table 1: Demographics of participants

	Online (n=62)	Blended (n=60)
Age		
18-25	56.7% (n=34)	66.1% (n=41)
Over 25	43.3% (n=26)	33.9% (n=21)
Sex		
Male	5.0% (n=3)	6.5% (4)
Female	95.0% (n=57)	93.5% (n=58)

Table 2: Motivation and Attitudes Scale Items (mean values and standard deviation)

	Online		Blended		Blended-online
<i>Item wording</i>	<i>Mean</i>	<i>sd</i>	<i>Mean</i>	<i>sd</i>	
I think that cs sessions are necessary (R)	3.32	.97	3.94	.92	.62
Time spent on cs takes nurses away from real work in the clinical areas (R)	2.65	.92	3.24	.95	.59
Supervision sessions could widen my clinical knowledge base	3.37	.92	3.92	.87	.55
CS could make me a better practitioner	3.43	.81	3.92	.80	.49
It is important to make time for cs sessions	3.52	.79	3.97	.48	.45
CS could improve the quality of care given to my patients	3.60	.81	4.00	.79	.40
I could widen my skill base during my cs session	3.52	.77	3.89	.73	.37
CS sessions could motivate staff	3.38	.76	3.76	.76	.37
CS sessions are an important part of a nurses work	3.47	.83	3.77	.71	.31

routine					
CS is for newly qualified inexperienced staff only (R)	3.78	.83	4.10	.84	.31
CS sessions could be intrusive (R)	3.00	1.01	3.29	.91	.31
I think receiving cs would improve the quality of care I give	3.55	.75	3.84	.77	.29
I could discuss sensitive issues encountered during my clinical casework with my supervisor	3.33	.88	3.61	.88	.28
CS is unnecessary for experienced staff (R)	3.83	.85	4.08	.73	.25
Having someone different to talk to about personal issues could be a great help	3.89	.71	3.67	.83	.22
CS should give me time to reflect	3.87	.54	4.05	.53	.18
Work pressures would interfere with CS sessions (R)	1.83	.62	1.98	.76	.15
Without cs the quality of patient care could deteriorate	3.25	.89	3.40	.97	.15
Fitting cs sessions in could lead to more pressure at work (R)	2.48	.91	2.60	.95	.11
CS sessions would facilitate reflective practice	4.00	.45	3.95	.56	.05
Work problems could be tackled constructively during cs sessions	3.83	.64	3.87	.72	.04
I can unload during a cs session	3.70	.65	3.74	.76	.04
CS does not solve personal issues (R)	3.05	1.01	3.06	1.10	.01
It could be difficult to find time for CS sessions (R)	1.87	.57	1.85	.57	.01

Note 1: Participants were asked, in relation to each statement to choose one of the following options: strongly agree, disagree, no opinion, agree or strongly agree. Some statements are phrased negatively (e.g. 'CS sessions could be intrusive') and some are phrased positively (e.g. 'CS sessions could motivate staff'). All negatively phrased items were reversed coded (R) such that a higher score on that items indicated a positive position. Hence, on all items a higher scores is associated with a more favourable position on CS.

Note 2: For all items the N for 'online only' is 60 and the N for 'blended' is 62.

Table 3: Knowledge Scale Items

<i>Answering Correctly</i>						
	<i>online</i>		<i>blended</i>		<i>Difference</i>	<i>Discrimination Index</i>
	%	N	%	N		
How often should supervision be undertaken (twice a year)	28.3	17	62.1	36	33.8	20.0
Which of the following is an aim of clinical supervision (encourage professional development)	68.3	41	89.8	53	21.5	86.7
When should ground rules be established (at the start of every session)	60.3	35	79.7	47	19.4	67.8
Supervision is... (used to improve patient safety)	46.6	27	66.1	39	19.5	43.3
the three elements of Proctors 1986 model are (formative, supportive, normative)	23.3	14	30.5	18	7.2	15.5
Which of the following is not a reflective model (Knowles)	11.9	7	11.9	7	0	37.6
What is not a supervision activity (performance review)	24.1	14	23.7	14	-0.4	55.5
How many standards for supervision are there (3)	23.7	14	19.3	11	-4.4	68.2
Which of the following is not a supervisors responsibility (evaluate the benefit of the session)	28.8	17	19.0	11	-9.8	11.6
Which of the following is not a supervisee responsibility (maintain	32.2	19	18.6	11	-13.6	52.7

confidentiality)						
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Table 4: Satisfaction Scale Items (interval and categorical)

4a: Satisfaction questions (interval)	Online			Blended			difference
	Mean	sd	n	Mean	sd	n	
The extent to which the training was efficiently organised was	2.95	.72	60	3.53	.88	59	.58
My overall rating of the training is	3.00	.78	60	3.58	.67	59	.58
The extent to which I found the training stimulating and challenging was	3.01	.72	60	3.46	.92	59	.44
The extent to which aims + objectives of the training were clearly stated was	3.27	.71	60	3.66	.88	59	.39
The extent to which the aims and objectives of the training were met was	3.08	.72	60	3.47	.75	59	.39

Note: the range for the interval level questions is 1-5, where 1=very poor and 5=excellent.

4b: Satisfaction questions (categorical)	Online		Blended		Blended-online
	%	n	%	n	
amount of work 'about right'	65.0	39	86.2	50	21.2

number of lectures 'about right'	65.5	36	84.5	49	19.0
number of tutorial 'about right'	65.5	36	84.5	49	19.0

Table 5: OLS Regression using education type to predict motivation/attitudes, knowledge and satisfaction

	Motivation and Attitudes				Knowledge				Satisfaction			
	b	95% ci	b	p	b	95% ci	b	p	b	95% ci	b	p
constant (Ref=Online)	79.50	77.01- 2.51		.000	3.51	3.12- 3.90		.000	26.49	24.69- 28.29		.000
Blended group	6.00	2.51- 9.49	.30	.001	.69	.14-1.24	.23	.015	4.40	1.88- 6.93	.313	.001
Adjusted R- sq	.08				.04				.09			

Table 6: OLS Regression using education type, training time length and age to predict motivation/attitudes, knowledge and satisfaction

	Motivation and Attitudes				Knowledge				Satisfaction			
	b	95% ci	<i>b</i>	p	b	95% ci	<i>b</i>	p	b	95% ci	<i>b</i>	p
constant	78.42	75.32- 81.51		.000	3.49	2.99- 3.99		.000	26.00	23.80- 28.20		.000
(Ref=Online) Blended group	7.14	3.69- 10.58	.36	.000	.69	.13-1.25	.23	.016	4.68	2.24- 7.13	.33	.000
(Ref=18-25) Older than 25	.78	-2.77- 4.33	.04	.664	.19	-.39-.76	.06	.516	-2.394	-4.91- .20	-.165	.062
(Ref=0-2 hrs tr.) Over 2hrs tr.	2.04	-1.69- 5.76	.09	.281	-.17	-.77-.43	-.05	.574	4.10	1.44- 6.75	.27	.003
Adjusted R- Sq	.11				.03				.17			